APPLICATION UNDER UNITED STATES PATENT LAWS

Invention: METHOD; APPARATUS AND IGNITION DEVICE FOR IGNITION OF INFLAMMABLE GASES FROM A FLARE ON E.G. A FLAME TOWER

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This is a:

[ ] Provisional Application

[ ] Regular Utility Application

[ ] Continuing Application

[XX] PCT National Phase Application

[ ] Design Application

[ ] Reissue Application

[ ] Plant Application

SPECIFICATION

Method, apparatus and ignition device for ignition of inflammable gases from a flare on e.g. a flame tower

The present invention relates to a method, an apparatus, and an ignition device for igniting combustible gases, for example, from a flare of a flare tower, where an ignition device is launched ~~in a direction~~ toward a region of combustible gas.

With respect to the ignition of gas flows, for example in a flare, a distinction may be made between two different ignition techniques. One technique is a ~~so-called~~ point ignition system, where the gas is ignited only at one point. This can be achieved by means of, for example, a match, a pilot burner, or a flame front generator. A prerequisite for point ignition is that the gas concentration at the point of ignition ~~has a concentration~~ is between the lower and the upper detonation line. The other technique is a ~~so called~~ volume ignition system, where ignition occurs through sparks being scattered ~~within~~ over a large ~~volume~~ area and ~~igniting~~ the gas in this ~~volume~~ area is ignited. The latter technique is ~~thereby~~ a great deal more reliable than the point ignition system.

~~The~~ Norwegian Patent Application No. 932017 teaches a method for the ignition of combustible gas emitted through a flare in a flare tower. The ignition device is ~~in the form of~~ a projectile which is fired ~~in a path in the direction~~ toward the gas outlet. The ignition device strikes an impact plate ~~which is~~ mounted at ~~the location of~~ the gas outlet, whereby the ignition device undergoes a reaction and brings a flow of incandescent particles into the gas flow, which is ignited ~~thereby~~. Thus, the ignition device is detonated by impact. This method ~~is encumbered with~~ has a number of inconveniences, ~~inter alia,~~ for instance ~~the fact that~~ the equipment used is excessively complicated. One ~~of the~~ reason ~~therefor~~ is that the ignition device is fired by means of very high propulsion gas pressure in the form of a gas pulse, having a pressure ~~at~~

a magnitude of 260-300 bar. The manner in which the ignition device is fired makes it impossible to stop the ignition device after it is launched, nor is it possible to return the ignition device to the launching means. This prior art solution makes use of a so-called protective tube having a clearance between the ignition pellet (the projectile) and the bore. All the energy for the pellet is supplied before it enters the protective tube (i.e., a normal shot at high pressure).

An object of the present invention is to provide a method, an apparatus, and an ignition pellet for igniting gases in a flare tower and avoid the disadvantages described above.

Another object of the present invention is to provide a device for igniting gases where the ignition pellet is not launched by high pressure, but is guided out of a launching tube which has a continuous supply of propulsion gas.

Another object of the invention is to provide a programmable ignition pellet, which may be stopped after it has been set in motion and which may be returned to the launching means.

Yet another object of the present invention is to provide an ignition pellet which is activated during its movement from the launching means to the flare by means of an electrical or mechanical device which initiates/activates the ignition pellet.

That which is particularly achieved by the present invention in relation to the known solution is a controlled and lower speed of the ignition pellet. This entails that the required safety zone surrounding the device can be smaller, and this will also mean that the danger to possible helicopter traffic near the flare tower will be reduced. Compared with the known solution, the present invention will entail far lower investment costs, inter alia, because there is only one

pressure level for the propulsion gas system and standard components may be more widely used than in the known solution. The present invention is also more flexible than the known solution by being adaptable to all types of flares.

The above objects are achieved by a method for the ignition of gases in a flare tower or flare ~~where~~ in which an ignition device is launched ~~in a direction~~ toward a region of a combustible gas, ~~which method according to the invention is characterized in that~~ the ignition device is propelled by means of a pressure medium through a guidance tube to ~~said~~ the gas cloud region, ~~that~~ the ignition device undergoes a reaction ~~for the purpose of active ignition of~~ which ignites the gas in ~~said~~ the gas cloud region, ~~the time for its~~ The activation and reaction ~~being~~ time is predetermined and adapted to the particular flare and application.

Preferably, the ignition device undergoes a reaction in the form of a shower or cloud of sparks, where at least parts of the shower of sparks ~~will~~ strike the cloud of gas.

Preferably, the ignition device is activated somewhere along its path through the tube ~~possibly~~ such as at the moment ~~when~~ the ignition device leaves the tube, ~~possibly~~ when the ignition device starts its journey through the tube, or ~~possibly by the fact that~~ when the ignition device strikes an object (impact plate) in the vicinity of the flare.

The ignition device may ~~optionally~~ be positioned within a trapping device prior to ~~the~~ its reaction ~~of the ignition device~~.

The ignition device may be propelled through the guidance tube at a moderate speed. It may ~~optionally be~~ stopped during its passage through the tube, and it may ~~optionally be reversed and returned back into~~ turn around and return to the guidance tube without a reaction taking place.

The present invention also ~~comprises~~ is an apparatus for ~~the use of~~ igniting gases in a flare tower or flare by ~~means of~~ an ignition device which is brought toward a region in or near a cloud of gas ~~and which is characterized by~~. The apparatus includes a guidance tube and a supply of a pressure medium, ~~where~~ the ignition device is adapted for propulsion through the guidance tube by means of the pressure medium ~~for the purpose of bringing~~ to place the ignition device close to the cloud of gas for a reaction near or within the cloud of gas.

Preferably, the apparatus comprises a feeding unit, a control device and, optionally, a magazine for the ignition device.

Preferably, an ignition initiator is mounted ~~somewhere~~ along the guidance tube ~~so as~~ to initiate/activate the ignition device which, after a time delay, undergoes a reaction outside the tube, in or near the cloud of gas.

Optionally, the apparatus comprises a trapping device for the ignition device after it has left the tube.

The present invention also ~~comprises~~ is an ignition device for use with the apparatus, ~~said~~ The device ~~being characterized in that it is~~ ~~in~~ has the ~~form~~ shape of an ignition pellet which is electrically or mechanically activated, ~~said~~ The ignition pellet ~~having~~ has a built-in delay prior to its reaction, the time for its activation and delay being predetermined and adapted to the particular flare and application.

BRIEF DESCRIPTION OF THE DRAWINGS

In what follows, the invention will be described in more detail with reference to the appended drawings.

Figure 1 shows a flare having an apparatus for the ignition of gas according to the present invention.

Figure 2 is a schematic view of a feeding unit and launching means according to the present invention.

Figure 3 shows an embodiment of the upper end of the apparatus according to the present invention.

Figure 4 shows another embodiment of the upper end of the apparatus according to the present invention.

Figure 5 shows an embodiment of a activator/electric initiator according to the present invention.

Figure 6 shows an embodiment of an electric ignition pellet according to the present invention.

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~~In~~ Figure 1 ~~is~~ shows the principle of igniting a gas flow 1 at a flare 2 at the end of a flare tower 3. An ignition pellet 4 is collected from a supply (for example a magazine), is loaded into a launching means 5, is ejected by means of a ~~so-called~~ pneumatic post system through a guidance tube 6, undergoes a reaction at the end of the flare 2, and forms a cloud of sparks which ignite the gas flow 1 at the flare 2. The ignition pellet 4 is conducted through the guidance tube 6 and ~~will the whole time bear~~ bears against the tube wall ~~which serves as a~~ for guidance and sealing. Thus, the pellet 4 is not fired as ~~it is~~ in ~~the case of the~~ known apparatus.

In Figure 2 the main components of the apparatus of the present invention are shown in more detail. The launching means 5 comprises a feeding unit 7 and a magazine 8 for ignition pellets 4. The launching means 5 is connected to the guidance tube 6 by ~~means of~~ a valve 9. The guidance tube 6 is connected with a propulsion gas supply 12 by ~~means of~~ a valve 10 and a reservoir tank 11. The launching means 5 is also connected with a control system 14. If the apparatus is to be used with electrically or mechanically activatable ignition pellets 4, a mechanical or electric initiator 13 is mounted on the guidance tube 6. The purpose of this initiator 13 will be described in more detail later.

~~The~~ Ignition takes place by an ignition pellet 4 ~~being~~ collected from the magazine 8 and loaded into the launching means 5. From the launching means 5, the ignition pellet 4 ~~will be~~ is ejected by ~~means of~~ a propulsion gas, for example pressurized air, having a pressure ~~in~~ or the magnitude of 0-20 bar, and propelled ~~further~~ into a tube system 6. After the ignition pellet has left the launching means 5, the ~~latter will be~~ is closed off because the valve 9 closes. Additional propulsion gas is supplied by the valve 10 opening and admitting propulsion gas, for example, pressurized air, into the tube 6 behind the ignition pellet 4. The valve 10 is connected to a propulsion gas supply 12 which optionally, is connected with a propulsion gas tank 11. The ignition pellet 4 will thereafter be pressed forward through the tube system 6 in accordance with the pneumatic post principle. The movement of the ignition pellet 4 in the tube 6 may be stopped, and the ignition pellet 4 may, optionally, be brought back to the launching means 5 by means of negative pressure.

The ignition pellet 4 may be either electrically or mechanically activated. When electrically ~~activatable~~ activated ignition pellets 4 are used, these will pass an activator unit 13 ~~consisting~~ comprising, for example, of two contact pieces. ~~Here~~ An electric impulse is applied to the ignition pellet and an electric igniter ~~will~~ start. This is shown in Figures 2, 5 and 6. The ignition pellet 4 may, for example, be designed with an exterior casing 15 and a guide strip 16 which ~~will~~ bears against the tube 6, preventing the propulsion gas ~~to leak~~ from leaking past the ignition pellet 4. This is shown on the left side of Figure 6. The exterior casing 15 may be a conductor carrying current and be connected with an igniter 18 inside the ignition pellet. This is shown on the right side of Figure 6.

The interior of the ignition pellet 4 ~~consists of~~ comprises a fire charge 17, an igniter 18, and a spark-forming medium 19. The

igniter 18 may be preprogrammed to go off after a certain period of time.

If the ignition pellet 4 is ~~of a~~ mechanically ~~activatable type~~ activated, the activator unit 13 is unnecessary. When the ignition pellet 4 is fetched from the magazine 8, the pellet 4 ~~will be~~ is activated by the removal of the safety device. The ignition pellet 4 is thereafter sent into the guidance tube 6. When the pellet 4 leaves the guidance tube 6, the pellet is set off by the release of the mechanical safety device. This can be solved, for example, by means of an activator of the hand grenade type. The ignition pellet is programmed for a time delay and may go undergo its reaction either in the middle of the gas cloud or in a basket.

Two different ways in which the reaction of the ignition pellet 4 may occur are shown in Figures 3 and 4, ~~one possibility, as shown in~~ In Figure 3, ~~being that~~ the ignition pellet 4 continues on a free path into the cloud of gas 1 after it has left the guidance tube 6. The ignition pellet 4 is programmed ~~so that it~~ to undergo ~~es~~ a reaction when it is in the middle of the gas cloud 1. The other possibility is that the ignition pellet 4 lands in a basket after it has left the guidance tube 6, as shown in Figure 4. The pellet ~~will then~~ remain in the basket 20 until its reaction. This solution demands less precision with respect to the time of ignition. The basket 20 is formed so that the sparks will be dispersed in the most favorable area with respect to the ignition of the gas cloud 1.

The present invention may also ~~make~~ use ~~of~~ ordinary ignition pellets 4, ~~the reaction of which occurs by~~ react upon impact. In that case ~~there may be used~~ a tube having a length of about 100 m and a propulsion gas having a low pressure ~~in~~ on the magnitude of 10 - 20 bar may be used. Since the ignition pellets 4 react ~~by~~ on impact, an impact plate (not shown) must be mounted at the outlet of the guidance tube 6.